

CLAIMS

1 1. A method of creating an electrically active pattern, the method comprising the steps
2 of:

- 3 a. providing a colloidal suspension of nanoparticles, the nanoparticles exhibiting
4 a desired electrical characteristic and being surrounded by an insulative shell;
5 b. applying the suspension to a substrate, the applied suspension being
6 substantially insulative owing to the nanoparticle shells; and
7 c. exposing the applied suspension to energy in a desired pattern, the energy
8 removing the shells from the nanoparticles and fusing the nanoparticles
9 together, thereby causing exposed portions of the applied suspension to
10 exhibit the electrical characteristic.

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1 2. The method of claim 1 further comprising the step of drying areas of the applied
2 suspension that have not received energy, the dried areas remaining insulative.

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1 3. The method of claim 1 wherein the suspension is applied to the substrate as a film.

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1 4. The method of claim 3 wherein the applied suspension is spin-coated to produce a
2 uniform film.

1 5. The method of claim 3 further comprising the step of applying a second suspension
2 of nanoparticles over the film and exposing the applied second suspension to energy in
3 a desired pattern, the energy removing the shells from the nanoparticles of the second
4 suspension and fusing them together without damaging the underlying film.

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1 6. The method of claim 5 wherein the nanoparticles of the second suspension have an
2 electrical characteristic different from the nanoparticles of the underlying film.

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1 7. The method of claim 5 further comprising repeating the application and exposing
2 steps to form a plurality of additional contiguous layers.

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1 8. The method of claim 1 wherein the suspension is applied to the substrate in a pattern
2 by displacement.

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1 9. The method of claim 8 wherein the displacement is performed so as to apply the
2 suspension to the substrate in a substantially planar pattern.

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1 10. The method of claim 9 further comprising the steps of again performing the
2 displacement so as to apply a second suspension onto the previously applied pattern
3 and exposing the applied second suspension to energy in a desired pattern, the energy
4 removing the shells from the nanoparticles of the second suspension and fusing them
5 together without affecting the underlying pattern.

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1 11. The method of claim 8 wherein the displacement is performed so as to produce a
2 first layer with projecting features; a second layer over the first layer, the first-layer
3 projections penetrating the second layer; and a third layer over the second layer in
4 contact with the first-layer projections.

1 12. The method of claim 8 wherein the displacement is performed so as to produce a
2 first layer; a second layer over the first layer, the second layer having gaps therein; and
3 a third layer over the second layer in contact with the first layer through the second-
4 layer gaps.

1 13. The method of claim 8 wherein the displacement is performed with a plurality of
2 suspensions different materials to form a patterned layer thereof on the substrate.

1 14. The method of claim 1 wherein the shells have a surface charge and the substrate
2 has a complementary charge in a pattern thereover, the applying step comprising
3 spreading the particles over the substrate and removing particles not immobilized by
4 the substrate charge.

1 15. The method of claim 14 wherein the applying and removing steps produce a new
2 layer, and further comprising the step of applying a surface charge to the new layer and
3 repeating the applying, exposing, and removing steps with a new colloidal suspension
4 of nanoparticles.

1 16. The method of claim 1 wherein the nanoparticles are conductive.

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1 17. The method of claim 1 wherein the nanoparticles are semiconductive.

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1 18. The method of claim 1 wherein the energy is in the form of electromagnetic
2 radiation.

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1 19. The method of claim 18 wherein the energy is provided by a laser.

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1 20. The method of claim 18 wherein the energy is provided by exposing the applied
2 suspension to a radiation source through a patterned photomask.

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1 21. The method of claim 1 wherein the energy is thermal.

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1 22. The method of claim 1 wherein the nanoparticles consist of a chemical compound,
2 the particles having a melting point lower than that of the compound in bulk.

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